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11-1-02

Carmen Johnson

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Ground Water Monitoring Report

November 2002 Monitoring Event

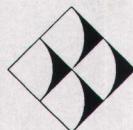
**Red Rock Construction & Demolition Debris Landfill
Holly Springs, North Carolina
NC Solid Waste Permit # 92-28**

Carmen Johnson

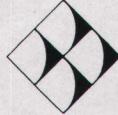
Fac/Perm/Co ID #:	Date:	Doc ID#:
<i>92-28</i>	<i>10/9/02</i>	<i>DIN</i>

Prepared for:
Waste Industries, Inc.
3301 Benson Drive Suite 601
Raleigh, NC 27609

January 2003



G.N. Richardson & Associates, Inc.
Engineering and Geological Services
14 North Boylan Avenue
Raleigh, North Carolina 27603



G.N. RICHARDSON & ASSOCIATES
Engineering and Geological Services

January 8, 2003

Mr. Tarry Gautney
General Manager - Solid Waste Disposal
7130 New Landfill Drive
Holly Springs, NC 27540

RE: Ground Water Monitoring
Red Rock Landfill
Holly Springs, North Carolina

Dear Mr. Gautney:

Enclosed please find the ground water monitoring report for the Red Rock Landfill's November ground water monitoring event. Analysis of these samples indicated only low levels of two metals which naturally occur in ground water in this area. This analysis is consistent with previous analyses of ground water at the site. The next ground water monitoring event is tentatively scheduled for May 2003.

A copy of this report has been forwarded to Mr. Larry Rose at NCDENR in accordance with your operating permit. If you have any questions, or require further information, please contact me at your earliest convenience.

Sincerely,
G. N. Richardson and Associates, Inc.

Joan A. Smyth, P.G.
Project Hydrogeologist

cc: Jerry Johnson - Waste Industries
Larry Rose - NCDENR



Red Rock C&D Landfill
Ground Water Monitoring Report
November 2002 Monitoring Event

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1.0 Introduction

On November 1 2002, Environment 1 Laboratory personnel performed the required semi-annual detection monitoring ground water sampling event at the Red Rock C&D Landfill. This sampling event satisfies the requirements of the detection monitoring program under Solid Waste Permit # 92-28. The following report summarizes the monitoring event, sampling procedures, field and laboratory results, and ground water characterization as required by NC Solid Waste Regulations. Also included are summary tables of ground water measurements, field parameters, and detected constituents, and the laboratory analytical report.

2.0 Sampling Procedures

Ground water sampling was performed at 7 well locations. In addition, semi-annual surface water monitoring was performed at two (2) locations down stream of the landfill and one upstream location. The monitoring locations are shown on **Figure 1**.

Sampling procedures followed the protocols set forth in the site's Water Quality Monitoring Plan and the North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities. Each well was gauged to determine ground water depth and then purged of three to five well volumes or until dry. The wells were purged and allowed to stabilize prior to sample collection. Ground water purging and sample collection were performed using a laboratory cleaned, dedicated, bailer.

Field measurements of pH, specific conductivity, temperature, and turbidity were taken at each well and surface water sampling location. Field meters were calibrated prior to sampling. Samples were collected in laboratory containers provided by Environment 1, Inc. (NC Laboratory Certification # 10). Upon collection, the samples were sealed, placed on ice, and transported to the laboratory. Field blanks were also collected for quality control purposes.

During the sampling process, each well was inspected for signs of damage or unusual conditions. All wells were found to be in good condition and free of obstructions.

Samples from surface water points SW-1, SW-2 and SW-3 were collected during ground water sample collection. The surface water locations are show in **Figure 1**.

3.0 Field and Laboratory Results

All samples were transported to the laboratory facility under proper chain of custody analyzed at the specified DWM Practical Quantitation Limits for Appendix I constituents. The laboratory analysis is included in **Appendix A**.

Ground water and field measurements are included as **Tables 1 and 2** respectively. The laboratory analysis detected no Appendix I organic compounds. Inorganic laboratory analysis

detected one inorganic constituent (barium) in the ground water samples. This is likely due to turbidity in the water from the wells.

Analysis of surface water samples indicated detectable levels of total lead in the sample from SW-2. These levels are also likely due to turbidity in the water sample.

4.0 Ground Water Characterization

A potentiometric surface map was prepared from ground water elevation data collected during this sampling event. Ground water velocity was calculated for each monitoring well on-site using the equation $V = (KI)/n$ where:

K = hydraulic conductivity

I = ground water gradient

n = porosity

Ground water velocities ranged from .0638 feet/day (MW-5) to 4.301 feet/day (MW-3). These calculations are included in **Table 3**. Ground water at the C&D landfill is migrating toward the south, east and west. The potentiometric surface for the C&D landfill is included as **Figure 1**.

5.0 Conclusions

The results of this monitoring event confirm that the ground water quality around the Red Rock C&D Landfill has not been impacted by the facility. The detected inorganic results are likely due to suspended solids in the samples, not actual dissolved inorganic parameters.

The next detection monitoring event is tentatively scheduled for May 2003. The results of this event will be included in the Fall Ground Water Monitoring Report. These samples will be analyzed for the full suite of Appendix I constituents.

Drawing Under Separate Cover

Table 1
Ground Water Elevations
Red Rock C&D Landfill
11/01/02

Well	Top of Casing	Depth to Water	Water Table Elevation
MW-1	280.60	26.37	254.23
MW-2T	281.19	26.20	254.99
MW-3	261.80	13.45	248.35
MW-4	254.10	2.49	251.61
MW-5	254.47	2.62	251.85
MW-6T	289.21	18.80	270.41
MW-10	301.16	15.53	285.63

Table 2
Field Parameters
Red Rock C&D Landfill
11/01/02

Well	pH (std units)	Sp. Conductivity (μ S)	Temperature (degrees C)
MW-1	7.3	2	16
MW-2T	7.1	1820	17
MW-3	7.1	4	17
MW-4	5.2	114	15
MW-5	5	254	15
MW-6T	7.4	4	17
MW-10	6.9	796	17
SW-1	5.2	59	13
SW-2	6.1	105	11
SW-3	7	155	11

Table 3
Ground Water Velocity Calculations
Red Rock C&D Landfill
11/01/02

Parameter Units	Hydraulic Conductivity feet/min	Porosity %	Hydraulic Gradient feet/foot	Velocity feet/min	Velocity feet/day
MW-1	3.760E-04	0.10	0.075	2.820E-04	4.061E-01
MW-2T	NA	0.10	0.063	NA	NA
MW-3	5.150E-03	0.10	0.058	2.987E-03	4.301E+00
MW-4	NA	0.10	0.035	NA	NA
MW-5	1.430E-04	0.10	0.031	4.433E-05	6.384E-02
MW-6T	NA	0.10	0.036	NA	NA
MW-10	1.970E-04	0.10	0.027	5.319E-05	7.659E-02

Notes Velocity calculated from $V=Kl/n$
V = Velocity
K = Hydraulic Conductivity
l = Gradient
n = Porosity
Hydraulic conductivity data from slug testing

Environment 1, Incorporated

P.O. BOX 7085, 114 OAKMONT DRIVE
GREENVILLE, N.C. 27835-7085

PHONE (252) 756-6208
FAX (252) 756-0633

Drinking Water ID: 37715

Wastewater ID: 10

ID#: 6011

RED ROCK LANDFILL (C&D)
MS. JOAN SMYTH
G.N. RICHARDSON & ASSOCIATES
425 N. BOYLAN AVENUE
RALEIGH , NC 27603

DATE COLLECTED: 11/01/02
DATE REPORTED : 12/03/02

REVIEWED BY:

PARAMETERS	Monitoring Well #1	Monitoring Well #2T	Monitoring Well #3	Monitoring Well #4	Monitoring Well #5	Analysis Date	Analyst	Method Code
PH (field measurement), Units	7.3	7.1	7.1	5.2	5.0	11/01/02	RJH	EPA150.1
Arsenic, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	11/21/02	MLH	EPA7060
Barium, mg/l	<0.500	<0.500	1.733	<0.500	<0.500	11/20/02	LFJ	EPA6010B
Cadmium, mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	11/25/02	MLH	EPA7131
Total Chromium, mg/l	<0.010		<0.010	<0.010	<0.010	11/25/02	LFJ	EPA6010B
Lead, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	11/27/02	LFJ	EPA6010B
Mercury, mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	11/21/02	MLH	EPA7421
Selenium, mg/l	<0.020	<0.020	<0.020	<0.020	<0.020	11/11/02	MLH	EPA7740
Silver, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	11/20/02	LFJ	EPA6010B
Conductivity (at 25c), uMhos	2	1820	4	114	254	11/01/02	RJH	SM2510B
Temperature, °C	16	17	17	15	15	11/01/02	RJH	SM2550B
Static Water Level, Feet	26.37	26.20	13.45	2.49	2.62	11/01/02	RJH	
Well Depth, feet	80.54	40.30	31.17	17.30	16.32	11/01/02	RJH	

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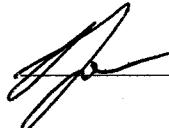
Drinking Water ID: 37715

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ID#: 6011

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MS. JOAN SMYTH
G.N. RICHARDSON & ASSOCIATES
425 N. BOYLAN AVENUE
RALEIGH ,NC 27603

DATE COLLECTED: 11/01/02
DATE REPORTED : 12/03/02

REVIEWED BY: 

PARAMETERS	Monitoring Well #6T	Monitoring Well #10	Surface Water #1	Surface Water #2	Surface Water #3	Analysis Date	Analyst	Method Code
PH (field measurement), Units	7.4	6.9	5.2	6.1	7.0	11/01/02	RJH	EPA150.1
Arsenic, mg/l	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	11/21/02	MLH	EPA7060
					< 0.010	12/02/02	MLH	EPA7060
					< 0.010	11/21/02	MLH	EPA7060
Barium, mg/l	0.787	< 0.500	< 0.500	< 0.500	< 0.500	11/20/02	LFJ	EPA6010B
Cadmium, mg/l	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	11/25/02	MLH	EPA7131
Total Chromium, mg/l	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	11/27/02	LFJ	EPA6010B
Lead, mg/l	< 0.010	< 0.010	< 0.010	0.011	< 0.010	11/21/02	MLH	EPA7421
Mercury, mg/l	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	11/05/02	LFJ	EPA7470
Selenium, mg/l	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	11/11/02	MLH	EPA7740
Silver, mg/l	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	11/20/02	LFJ	EPA6010B
Conductivity (at 25c), uMhos	4	796	59	105	155	11/01/02	RJH	SM2510B
Temperature, °C	17	17	13	11	11	11/01/02	RJH	SM2550B
Static Water Level, Feet	18.80	15.53				11/01/02	RJH	
Well Depth, feet	47.32	20.23				11/01/02	RJH	

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RALEIGH, NC 27603

CLIENT ID: 6011

ANALYST: CMT
DATE COLLECTED: 11/01/02 Page: 1
DATE REPORTED: 12/03/02

REVIEWED BY:

VOLATILE ORGANICS
EPA METHOD 8260B

PARAMETERS, ug/l	Date Analyzed:	11/07/02 Monitoring Well #1	11/07/02 Monitoring Well #2T	11/07/02 Monitoring Well #3	11/07/02 Monitoring Well #4	11/07/02 Monitoring Well #5
1. Chloromethane		<10.00	<10.00	<10.00	<10.00	<10.00
2. Vinyl Chloride		<10.00	<10.00	<10.00	<10.00	<10.00
3. Bromomethane		<10.00	<10.00	<10.00	<10.00	<10.00
4. Chloroethane		<10.00	<10.00	<10.00	<10.00	<10.00
5. Trichlorofluoromethane		<5.00	<5.00	<5.00	<5.00	<5.00
6. 1,1-Dichloroethene		<5.00	<5.00	<5.00	<5.00	<5.00
7. Acetone		<100.00	<100.00	<100.00	<100.00	<100.00
8. Iodomethane		<10.00	<10.00	<10.00	<10.00	<10.00
9. Carbon Disulfide		<100.00	<100.00	<100.00	<100.00	<100.00
10. Methylene Chloride		<10.00	<10.00	<10.00	<10.00	<10.00
11. trans-1,2-Dichloroethene		<5.00	<5.00	<5.00	<5.00	<5.00
12. 1,1-Dichloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
13. Vinyl Acetate		<50.00	<50.00	<50.00	<50.00	<50.00
14. Cis-1,2-Dichloroethene		<5.00	<5.00	<5.00	<5.00	<5.00
15. 2-Butanone		<100.00	<100.00	<100.00	<100.00	<100.00
16. Bromochloromethane		<5.00	<5.00	<5.00	<5.00	<5.00
17. Chloroform		<5.00	<5.00	<5.00	<5.00	<5.00
18. 1,1,1-Trichloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
19. Carbon Tetrachloride		<10.00	<10.00	<10.00	<10.00	<10.00
20. Benzene		<5.00	<5.00	<5.00	<5.00	<5.00
21. 1,2-Dichloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
22. Trichloroethene		<5.00	<5.00	<5.00	<5.00	<5.00
23. 1,2-Dichloropropane		<5.00	<5.00	<5.00	<5.00	<5.00
24. Bromodichloromethane		<5.00	<5.00	<5.00	<5.00	<5.00
25. Cis-1,3-Dichloropropene		<10.00	<10.00	<10.00	<10.00	<10.00
26. 4-Methyl-2-Pentanone		<100.00	<100.00	<100.00	<100.00	<100.00
27. Toluene		<5.00	<5.00	<5.00	<5.00	<5.00
28. trans-1,3-Dichloropropene		<10.00	<10.00	<10.00	<10.00	<10.00
29. 1,1,2-Trichloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
30. Tetrachloroethene		<5.00	<5.00	<5.00	<5.00	<5.00
31. 2-Hexanone		<50.00	<50.00	<50.00	<50.00	<50.00
32. Dibromochloromethane		<5.00	<5.00	<5.00	<5.00	<5.00
33. 1,2-Dibromoethane		<5.00	<5.00	<5.00	<5.00	<5.00
34. Chlorobenzene		<5.00	<5.00	<5.00	<5.00	<5.00
35. 1,1,1,2-Tetrachloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
36. Ethylbenzene		<5.00	<5.00	<5.00	<5.00	<5.00
37. Xylenes		<5.00	<5.00	<5.00	<5.00	<5.00
38. Dibromomethane		<10.00	<10.00	<10.00	<10.00	<10.00
39. Styrene		<10.00	<10.00	<10.00	<10.00	<10.00
40. Bromoform		<5.00	<5.00	<5.00	<5.00	<5.00
41. 1,1,2,2-Tetrachloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
42. 1,2,3-Trichloropropane		<15.00	<15.00	<15.00	<15.00	<15.00
43. 1,4-Dichlorobenzene		<5.00	<5.00	<5.00	<5.00	<5.00
44. 1,2-Dichlorobenzene		<5.00	<5.00	<5.00	<5.00	<5.00
45. 1,2-Dibromo-3-Chloropropane		<25.00	<25.00	<25.00	<25.00	<25.00
46. Acrylonitrile		<200.00	<200.00	<200.00	<200.00	<200.00
47. trans-1,4-Dichloro-2-Butene		<100.00	<100.00	<100.00	<100.00	<100.00

Environment 1, Incorporated

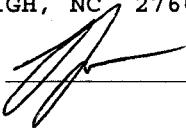
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DATE COLLECTED: 11/01/02 Page: 2
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REVIEWED BY: 

VOLATILE ORGANICS EPA METHOD 8260B

PARAMETERS, ug/l	Date Analyzed:	11/12/02 Monitoring Well #6T	11/12/02 Monitoring Well #10	11/12/02 Surface Water #1	11/12/02 Surface Water #2	11/12/02 Surface Water #3
1. Chloromethane		<10.00	<10.00	<10.00	<10.00	<10.00
2. Vinyl Chloride		<10.00	<10.00	<10.00	<10.00	<10.00
3. Bromomethane		<10.00	<10.00	<10.00	<10.00	<10.00
4. Chloroethane		<10.00	<10.00	<10.00	<10.00	<10.00
5. Trichlorofluoromethane		<5.00	<5.00	<5.00	<5.00	<5.00
6. 1,1-Dichloroethene		<5.00	<5.00	<5.00	<5.00	<5.00
7. Acetone		<100.00	<100.00	<100.00	<100.00	<100.00
8. Iodomethane		<10.00	<10.00	<10.00	<10.00	<10.00
9. Carbon Disulfide		<100.00	<100.00	<100.00	<100.00	<100.00
10. Methylene Chloride		<10.00	<10.00	<10.00	<10.00	<10.00
11. trans-1,2-Dichloroethene		<5.00	<5.00	<5.00	<5.00	<5.00
12. 1,1-Dichloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
13. Vinyl Acetate		<50.00	<50.00	<50.00	<50.00	<50.00
14. Cis-1,2-Dichloroethene		<5.00	<5.00	<5.00	<5.00	<5.00
15. 2-Butanone		<100.00	<100.00	<100.00	<100.00	<100.00
16. Bromochloromethane		<5.00	<5.00	<5.00	<5.00	<5.00
17. Chloroform		<5.00	<5.00	<5.00	<5.00	<5.00
18. 1,1,1-Trichloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
19. Carbon Tetrachloride		<10.00	<10.00	<10.00	<10.00	<10.00
20. Benzene		<5.00	<5.00	<5.00	<5.00	<5.00
21. 1,2-Dichloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
22. Trichloroethene		<5.00	<5.00	<5.00	<5.00	<5.00
23. 1,2-Dichloropropane		<5.00	<5.00	<5.00	<5.00	<5.00
24. Bromodichloromethane		<5.00	<5.00	<5.00	<5.00	<5.00
25. Cis-1,3-Dichloropropene		<10.00	<10.00	<10.00	<10.00	<10.00
26. 4-Methyl-2-Pentanone		<100.00	<100.00	<100.00	<100.00	<100.00
27. Toluene		<5.00	<5.00	<5.00	<5.00	<5.00
28. trans-1,3-Dichloropropene		<10.00	<10.00	<10.00	<10.00	<10.00
29. 1,1,2-Trichloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
30. Tetrachloroethene		<5.00	<5.00	<5.00	<5.00	<5.00
31. 2-Hexanone		<50.00	<50.00	<50.00	<50.00	<50.00
32. Dibromochloromethane		<5.00	<5.00	<5.00	<5.00	<5.00
33. 1,2-Dibromoethane		<5.00	<5.00	<5.00	<5.00	<5.00
34. Chlorobenzene		<5.00	<5.00	<5.00	<5.00	<5.00
35. 1,1,1,2-Tetrachloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
36. Ethylbenzene		<5.00	<5.00	<5.00	<5.00	<5.00
37. Xylenes		<5.00	<5.00	<5.00	<5.00	<5.00
38. Dibromomethane		<10.00	<10.00	<10.00	<10.00	<10.00
39. Styrene		<10.00	<10.00	<10.00	<10.00	<10.00
40. Bromoform		<5.00	<5.00	<5.00	<5.00	<5.00
41. 1,1,2,2-Tetrachloroethane		<5.00	<5.00	<5.00	<5.00	<5.00
42. 1,2,3-Trichloropropane		<15.00	<15.00	<15.00	<15.00	<15.00
43. 1,4-Dichlorobenzene		<5.00	<5.00	<5.00	<5.00	<5.00
44. 1,2-Dichlorobenzene		<5.00	<5.00	<5.00	<5.00	<5.00
45. 1,2-Dibromo-3-Chloropropane		<25.00	<25.00	<25.00	<25.00	<25.00
46. Acrylonitrile		<200.00	<200.00	<200.00	<200.00	<200.00
47. trans-1,4-Dichloro-2-Butene		<100.00	<100.00	<100.00	<100.00	<100.00

Environment 1, Incorporated

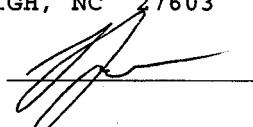
Wastewater ID: 10

P.O. BOX 7085, 114 OAKMONT DRIVE
GREENVILLE, N.C. 27835-7085

PHONE (252) 756-6208
FAX (252) 756-0633

CLIENT: RED ROCK LANDFILL (C&D)
MS. JOAN SMYTH
G.N. RICHARDSON & ASSOCIATES
425 N. BOYLAN AVENUE
RALEIGH, NC 27603

CLIENT ID: 6011
ANALYST: CMT
DATE COLLECTED: 11/01/02 Page: 3
DATE REPORTED: 12/03/02

REVIEWED BY: 

VOLATILE ORGANICS
EPA METHOD 8260B

PARAMETERS, ug/l	Date Analyzed: 11/07/02 Trip Blank
1. Chloromethane	<10.00
2. Vinyl Chloride	<10.00
3. Bromomethane	<10.00
4. Chloroethane	<10.00
5. Trichlorofluoromethane	<5.00
6. 1,1-Dichloroethene	<5.00
7. Acetone	<100.00
8. Iodomethane	<10.00
9. Carbon Disulfide	<100.00
10. Methylene Chloride	<10.00
11. trans-1,2-Dichloroethene	<5.00
12. 1,1-Dichloroethane	<5.00
13. Vinyl Acetate	<50.00
14. Cis-1,2-Dichloroethene	<5.00
15. 2-Butanone	<100.00
16. Bromochloromethane	<5.00
17. Chloroform	<5.00
18. 1,1,1-Trichloroethane	<5.00
19. Carbon Tetrachloride	<10.00
20. Benzene	<5.00
21. 1,2-Dichloroethane	<5.00
22. Trichloroethene	<5.00
23. 1,2-Dichloropropane	<5.00
24. Bromodichloromethane	<5.00
25. Cis-1,3-Dichloropropene	<10.00
26. 4-Methyl-2-Pentanone	<100.00
27. Toluene	<5.00
28. trans-1,3-Dichloropropene	<10.00
29. 1,1,2-Trichloroethane	<5.00
30. Tetrachloroethene	<5.00
31. 2-Hexanone	<50.00
32. Dibromochloromethane	<5.00
33. 1,2-Dibromoethane	<5.00
34. Chlorobenzene	<5.00
35. 1,1,1,2-Tetrachloroethane	<5.00
36. Ethylbenzene	<5.00
37. Xylenes	<5.00
38. Dibromomethane	<10.00
39. Styrene	<10.00
40. Bromoform	<5.00
41. 1,1,2,2-Tetrachloroethane	<5.00
42. 1,2,3-Trichloropropene	<15.00
43. 1,4-Dichlorobenzene	<5.00
44. 1,2-Dichlorobenzene	<5.00
45. 1,2-Dibromo-3-Chloropropane	<25.00
46. Acrylonitrile	<200.00
47. trans-1,4-Dichloro-2-Butene	<100.00

Environment¹, Inc.
P.O. Box 7085, 114 Oakmont Dr.
Greenville, NC 27858

Phone (252) 756-6208 • Fax (252) 756-0633

CLIENT: 6011

Week 47

RED ROCK LANDFILL (C&D)
MS. JOAN SMYTH
G.N. RICHARDSON & ASSOCIATES
225 N. BOYLAN AVENUE
RALEIGH NC 27603

919) 828-0577

Instructions for completing this form are on the reverse side.

Sampler must place a "C" for composite sample or a "G" for Graph sample in the blocks above for each parameter required.

No. 74565

FORM #5